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**Abstract**

**SOME ENGINEERING PROBLEMS OF THE S.G.H.W. 100 MW(E) PROTOTYPE**

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1. The paper discusses some of the more novel engineering features of the S.G.H.W. reactor described by Fawcett, Firth and Holmes<sup>(1)</sup>
2. The problem of joining the zirconium pressure tubes to the steel primary circuit has been investigated and two types of mechanical joints, i.e. rolled and bolted, have been successfully developed and tested.
3. Dual moderation leads to a tight pressure tube lattice pitch and the engineering solution adopted is described. The results of temperature distribution tests in the bulk moderator are given.
4. Superheat channels are provided to demonstrate that future S.G.H.W. power reactors can exploit the advantages of superheat without sacrificing prototype safety or availability. In these channels, gamma heat generated in the zirconium pressure tube is removed by circulating boiling water through an internal annulus, operating in parallel with the main boiling channels. A thin stainless steel liner prevents convective heat transfer from the superheated steam to the annulus.

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5. Experimental loop facilities are described, these being provided for one "cluster" fuel element under boiling water conditions associated with a carbon steel circuit, and two "pencil" fuel element channels associated with a stainless steel circuit. Provision is made to discharge coolant from one superheat channel to the condenser when testing an advanced or intentionally defected superheat fuel cluster.
6. Refuelling of the reactor during operation presents a number of design problems requiring novel solutions. Test work leading to solutions for the main problems is outlined.
7. The parameters affecting primary circulating pump run-down time and the means by which the required inertia can be built into the system are outlined. The reasons for choosing a "wet" winding glandless circulating pump are given.

#### REFERENCES

- (1) FAWCETT, S., FIRTH, A., HOLMES, J. E. R., General Design of the S.G.H.W. Reactor